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Two New Species of *Neoribates* (*Neoribates*) (Acari, Oribatida) from Shikoku Island, Japan

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Abstract Two new species, *Neoribates alius* n. sp. and *N. similis* n. sp. were described from twelve temples in Shikoku Island.

Key words: Japan, *Neoribates* (*Neoribates*), Oribatida, Shikoku Island, New species

Three species belonging to the genus *Neoribates* (*Neoribates*) have been recorded from Shikoku Island, namely, *N. macrosacculatus* Aoki, 1966 from Tokushima Prefecture, *N. pallidus* Aoki, 1988 from Kochi Prefecture, *N. macrosacculatus* and *N. pallidus* from Ehime Prefecture by Yamamoto & Yamamoto (2000), and *N. roubali* (Berlese, 1910) from Ehime Prefecture by Yamamoto (1988). All specimens of the genus *Neoribates* in the present work were collected from soil materials of the gardens, graveyards and forests associated with twelve temples in Shikoku Island, of which detail data were summarized in Table 1. The type specimens are deposited in the National Museum of Nature and Science Tokyo.

Neoribates (*Neoribates*) *alius* n. sp.

[Japanese name: Kumifukurofurisodedani]

(Figs. 1 & 2)

Or-251 Galumnidae sp. Ko-197: Nakamura, et al., 2006, p. 43.

Material examined: Holotype (Male) (NSMT-Ac 12104): from litter, humus and soil sample at the gardens, grave yards and forests of the Hantaji Temple (No. 50) at Matsuyama City, Ehime Prefecture, Jan.-12-2003, T. Fujikawa & Y. Nakamura; 1 allotype (NSMT-Ac 12106): from litter, humus and soil sample at the gardens, grave yards and forests of the Könomineji Temple (No. 27) at Yasuda chō, Köchi Prefecture, Jan.-17-2005, T. Fujikawa & Y. Nakamura; 7 paratypes (NSMT-Ac 12105 : Male): from litter, humus and soil sample at the gardens, grave yards and forests of the Dainichiji (No. 13) at Tokushima City, Tokushima Prefecture, Tairyuuji (No. 21) at Anan City, Tokushima Prefecture, Yakuōji (No. 23) at Minami Chō, Tokushima Prefecture, Unpenji (No. 66) at Miyoshi City, Tokushima Prefecture, Kanwonji (No. 69) at Kanwonji City, Kagawa Prefecture, Iyadaniji (No. 71) at Mitoyo City, Kagawa Prefecture, and Kouyamaji (No. 74) at Zentsüji City, Kagawa Prefecture, Temples.

Etymology: After the dimorphism.

Measurements and body appearance: Male (n= 8): Body length, 529 (565) 643μm; width, 457(519)607μm. Body color light yellow, transparent. The whole integument except pteromorphae smooth; pteromorphae veined. Female (n=

Table 1. Environmental data of the sampling localities. All samples were collected by Y. Nakamura and T. Fugikawa.

Number of temple	Name of temple	The Superior	Locality	Latitude(N.L.)	Longitude(E.L.)	Above the sea (m)	Sampling date
No. 13	Dainichiji	Ouguri Koei	Tokushima City, Tokushima Pref.	34°02'15	134°77'39	10	15-Jan-05
No. 20	Kakurinji	Nakatsu Kouo	Katsuura chō, Tokushima Pref.	33°54'49	134°30'19	400	16-Jan-05
No. 21	Tairyuuji	Shimamura Taijin	Anan City, Tokushima Pref.	33°52'53	134°31'12	520	16-Jan-05
No. 23	Yakuōji	Imagawa Taishin	Minami chō, Tokushima Pref.	33°43'56	134°31'38	10	16-Jan-05
No. 27	Könomineji	Minami Kangen	Yasuda chō, Köchi Pref.	33°28'03	133°58'29	440	17-Jan-05
No. 35	Kiyotakiji	Ito Shoryu	Tosa City, Köchi Pref.	33°30'44	133°24'33	150	2-Dec-04
No. 36	Shōryūji	Tanaka Giryo	Tosa City, Köchi Pref.	33°25'33	133°27'02	40	2-Dec-04
No. 50	Hantaji	Kobayashi Ryusei	Matsuyama City, Ehime Pref.	33°49'40	132°48'16	60	12-Jan-03
No. 66	Unpenji	Fuchikawa Keishi	Miyoshi City, Tokushima Pref.	34°02'27	133°43'24	927	8-Feb-04
No. 69	Kanwonji	Habara Kyodou	Kanwonji City, Kagawa Pref.	34°08'03	133°38'50	45	8-Feb-04
No. 71	Iyadaniji	Tatebayashi Ryogo	Mitoyo City, Kagawa Pref.	34°13'48	133°43'27	210	8-Feb-04
No. 74	Kouyamaji	Ohbayashi Kyouzen	Zentsüji City, Kagawa Pref.	34°14'10	133°45'55	20	7-Feb-04

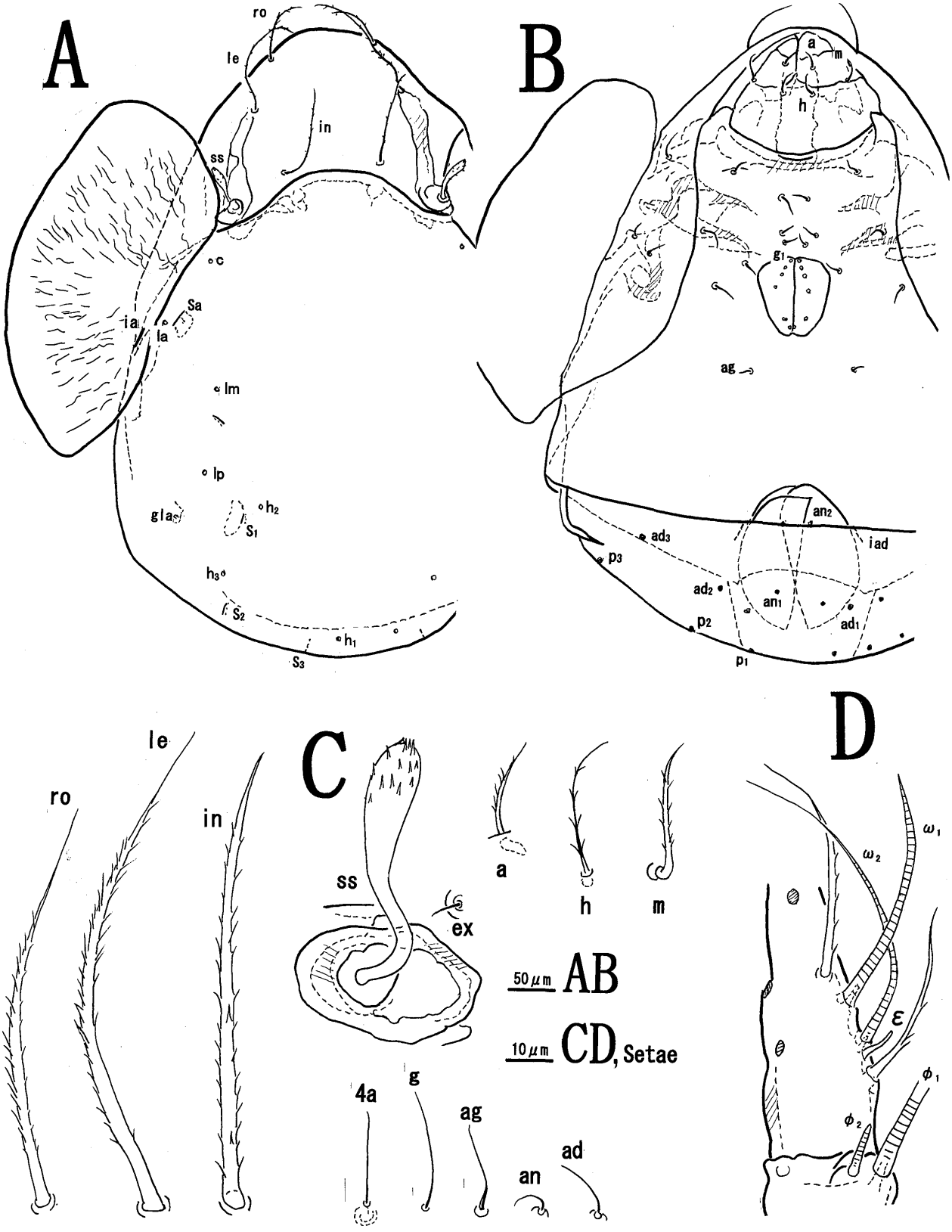

Fig. 1. *Neoribates (Neoribates) alius* n. sp. (NSMT-Ac 12104 ♂) A, Dorsal view; B, Ventral view; C, Right bothridial region; D, Right solenidial region of tarsus I and tibia I.

ro, le, in, ex: Rostral, lamellar, interlamellar, and exobothridial setae; *ss*: Sensillus: *c, la, lm, lp,* $h_{1\text{-}3}$, $p_{1\text{-}3}$: Dorsal setae; *ia, iad*: Lyrifissures; *g, ag,* $an_{1\text{-}2}$, $ad_{1\text{-}3}$: Genital, aggenital, anal and adanal setae; *a, m, h*: Anterior, medial and posterior subcapitular setae; *4a*: Epimeral setae; gla: Latero-opisthosomatic gland; ε : Famulus on tarsus of leg I; $\omega_{1\text{-}2}$, $\phi_{1\text{-}2}$,: Solenidia on tarsi and tibiae.

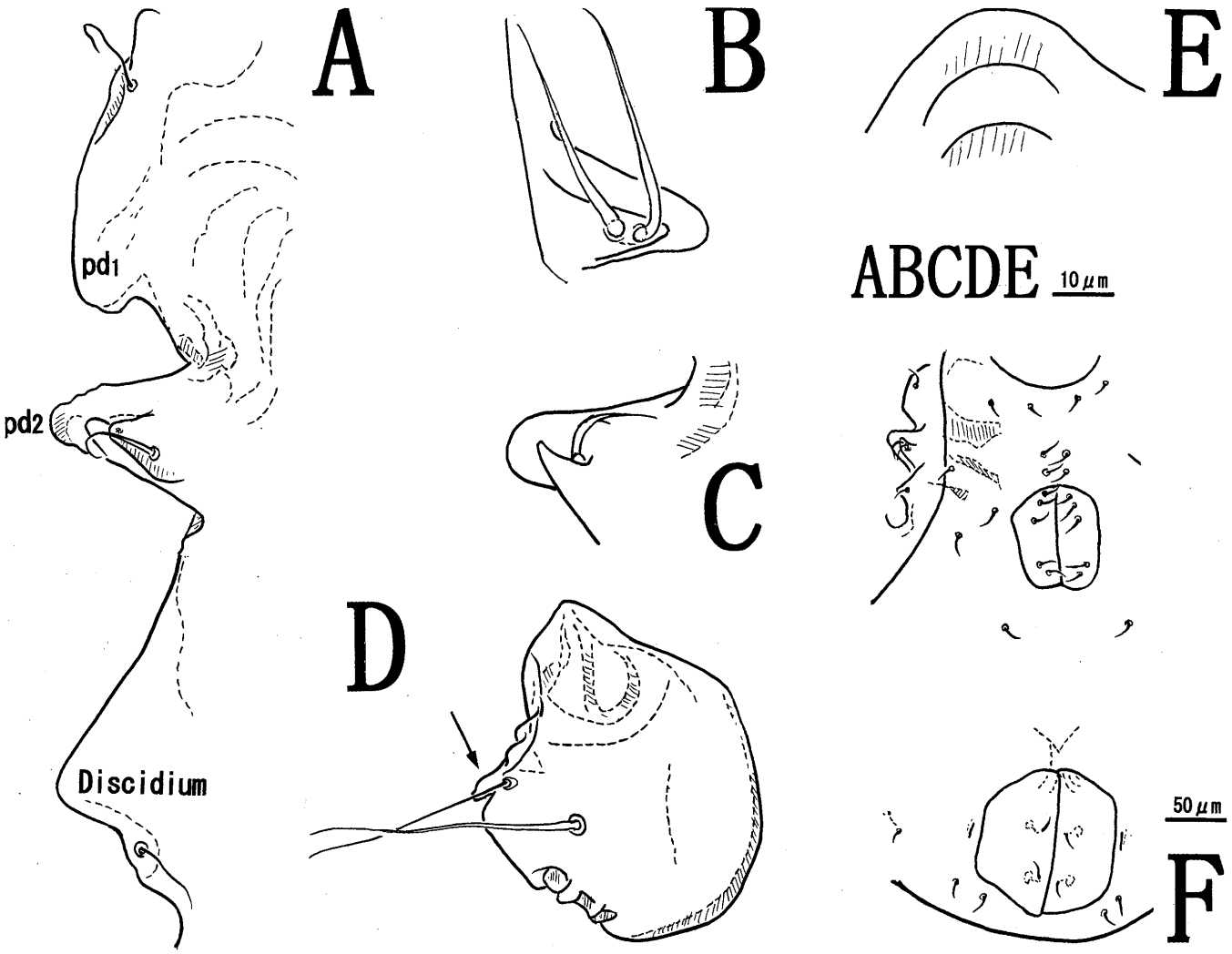

Fig. 2. *Neoribates (Neoribates) alius* n. sp. A, C, D: (NSMT-Ac 12105 ♂); B, E, F: (NSMT-Ac 12106 ♀). A, Right pedotectal region; B, left pedotectum II; C, Right pedotectum II; D, Right trochanter III (Black arrow shows a small protruding); E, Rostrum; F, Genito-anal region.

1): Body length 571μm; width 393μm. Body color reddish brown, opaque. Surface of whole body smooth; pteromorphae without vein.

Description of male: (NSMT-Ac 12104 & 12105)

Prodorsum: Rostrum widely rounded; rostral setae (*ro*) thin, barbed, inserted at the lateral side. Lamellae very thin, indistinct; more or less arched, short, extending forwards from the inside of bothridium for a distance equal to half the length of the propodosoma (Fig. 1A). Lamellar setae (*le*) thin, barbed, originating at the end of lamellae extending for a short distance in front of rostral anterior margin. Translamella or translamellar trace absent. Interlamellar setae (*in*) thin, barbed, extending to the level of mid-distance between setae *ro* and *le*. Bothridium directed anteriorly. Sensilli composed of a thin short stem and an expanded head bearing barbs. Exobothridial setae (*ex*) smooth. Relative lengths and distances: *le* > *in* > *ro* > *ss* > *ex*; (*le-le*) > (*ro-ro*) > (*in-in*) > (*le-in*) > (*ro-le*).

Notogaster: Notogastral length almost equal to width. Dorsosejugal suture continuous medially, strongly convex. Movable pteromorphae large, with rounded margin, without pointed apex nor concave margin, extending from the level of setae *lp* to the level of insertion of setae *le*; remarkable vein with lyrifissure *ia*. Ten pairs of alveoli of dorsal setae present. Areae porosae absent. Sacculi *Sa* aligned parallel to lateral ridge of notogaster; seta *la* inserted between *Sa* and lateral ridge. Lyrifissures *im* aligned obliquely, between *lm* and *lp*. Sacculi S_1 situated lateral to seta h_2; S_2 posterior to h_3; S_3 postero-laterally to h_1.

Ventral region: Genital opening with wider anterior margin than posterior margin, smaller than anal opening. Interspace between genital and anal openings about twice as long as the length of genital opening. Genito-anal setae: (6[5]-1-2-3); setae thin, smooth; genital setae variable in number. Setae ad_1, ad_2 postanal; ad_3 adanal; Setae ad_3 far from anal plates at the level of setae an_2; distance (ad_3-ad_3) about three times longer than the width of anal opening (Fig. 1B). Lyrifissures *iad* aligned inverse apoanal at the level of setae an_2 and ad_3. Sternal ridge and apodemata indistinct. Epimeral setae: (3-1-3[4]-3); setae smooth, variable in number. Epimeral seta $_3c$ variably originated under or on a small pointed projection; one specimen with $_3c$ on each pedotectum II; four specimens under each pedotectum II; two specimens on left or right, or under pedotectum II (Figs. 2A-C). Diarthric subcapitulum bearing 3 pairs of setae (*a*, *m*, *h*); setae sparsely barbed. Relative lengths and distances: $h \fallingdotseq m > g > a > ag \fallingdotseq {}_4a > ad > an$; ($ad_3$-$ad_3$) $\fallingdotseq 2 \times$ (ad_2-ad_2) > (*ag*-*ag*) > (ad_1-ad_1).

Legs: All tarsi heterotridactylous; claws serrate. Setal formula of legs including famulus but excluding solenidia, I (1-5-3-4-18), II (1-5-3-4-15), III (2-3-1-3-15), IV (1[2]-2-2-3-12); setae on Trochanter IV variable in number. Trochantera III and IV bearing small protrusion. Solenidiotaxy; I (1-2-2), II (1-1-2), III (1-1-0), IV (0-1-0). Famulus on Tarsus I bacilliform, situated posterior to ω_1I and ω_2I (Fig. 1D). Solenidion ϕ_2I situated lateral to ϕ_1I.

Description of female: Rostrum with a light area. Pteromorphae without veins, extending to the level of the insertions of lamellar setae from lyrifissures *im*. Anal aperture almost equal in length to that of male. However, genital aperture and interspace between genito-anal apertures longer than those of male; genital aperture about 1.7 × as long as interspace between genital and anal apertures. Lyrifissures *iad* aligned parallel to lateral margin of anal aperture. Epimeral setae: (3-1-4-3); each $_3c$, $_4c$ of left and right pedotectum II inserted on a pointed projection. Other features as in male.

Remarks: The new species is similar to *Neoribates pallidus* Aoki, 1988 and *N. parvisetigera* (Aoki, 1965) in form and length of sensilli and interlamellar setae. The present species is, however, different from any other members of the genus *Neoribates* (*Neoribates*) (17 spp.) by (1) vein pteromorphae without pointed apex, (2) inner lamellar line extending from the inside of bothridium, (3) 5 or 6 pairs of genital setae, and (4) pedotecta II with a small pointed projection, under or on which epimeral seta $_3c$ is originated.

***Neoribates (Neoribates) similis* n. sp.**

[Japanese name: Minamifukurofurisodedani]

(Figs. 3)

Or-242 *Neoribates* sp. Ko-190: Nakamura, et al., 2006, p. 43.

Material examined: Holotype (NSMT-Ac 12107): from litter, humus and soil samples at the gardens, grave yards and forests of the Kiyotakiji Temple (No. 35) at Tosa City, Kochi Prefecture, Dec. 2-2004, T. Fujikawa & Y. Nakamura; 1 paratype (NSMT-Ac 12108): from Kakurinji (No. 20) at Katsuura chō, Tokushima Prefecture; 3 paratypes (NSMT-Ac 12109) from Shōryūji (N. 36) at Tosa City, Köchi Prefecture, Temples.

Etymology: After the resemblance to *N. aurantiacus* (non Oudemans) *sensu* Aoki, 1966.

Measurements and body appearance (n= 5 females): Body length, 464 (504) 529μm; width, 286 (329)364μm. Body color brown. Body surface smooth.

Prodorsum: Rostrum slightly protruding; rostral setae (*ro*) barbed, inserted on the lateral side. Lamellar ridges thin strongly curved anteriorly, extending forwards from bothridia for a distance equal to about two-third the length of propodosoma. Setae *le* originating at the end of lamellae. Translamellar ridge absent. Interlamellar setae (*in*) thin, barbed, extending slightly beyond the insertions of setae *le*. Bothridia directed antero-laterally. Sensilli composed of a long thin smooth stem and a lanceolate head bearing spicules and terminating in a fine point. Relative lengths and distances: *in* > *ss* > *le* > *ro*; (*le*-*in*) > (*in*-*in*) > (*le*-*le*) $\fallingdotseq$ (*ro*-*ro*) > (*ro*-*le*).

Notogaster: Almost circular with continuous dorsosejugal suture, strongly arched medially. Ten pairs of alveoli of dorsal setae and four pairs of sacculi present; seta *lp*, sacculi S_1 and gland opening arranged in the same level. Pteromorphae indistinctly veined, pointed posteriorly, extending from the level of lyrifissure *im* to the insertions of *le*. Lyrifissurre *ia* and sacculi *Sa* aligned parallel to the hinge joint.

Ventral region: Interspace between genital and anal apertures appreciably longer than anal aperture, or more than twice as long as genital aperture. Genito-anal setae (4-1-2-3); setae short, smooth. Setae ad_1 postanal, ad_2 adanal, ad_3 preanal. Lyrifissures *iad* paraanal. Relative distances, (ad_2-ad_2) > (ad_3-ad_3) > (ad_1-ad_1) $\fallingdotseq$ (*ag*-*ag*). Epimeral setae: (3-1-3-3); setae barbed. Pedotecta II without projection. Diarthric subcapitulum bearing 3 pairs of setae (*a, m, h*); setae barbed. Relative lengths: $h > a > m > 1a > ag > g \fallingdotseq an \fallingdotseq ad$.

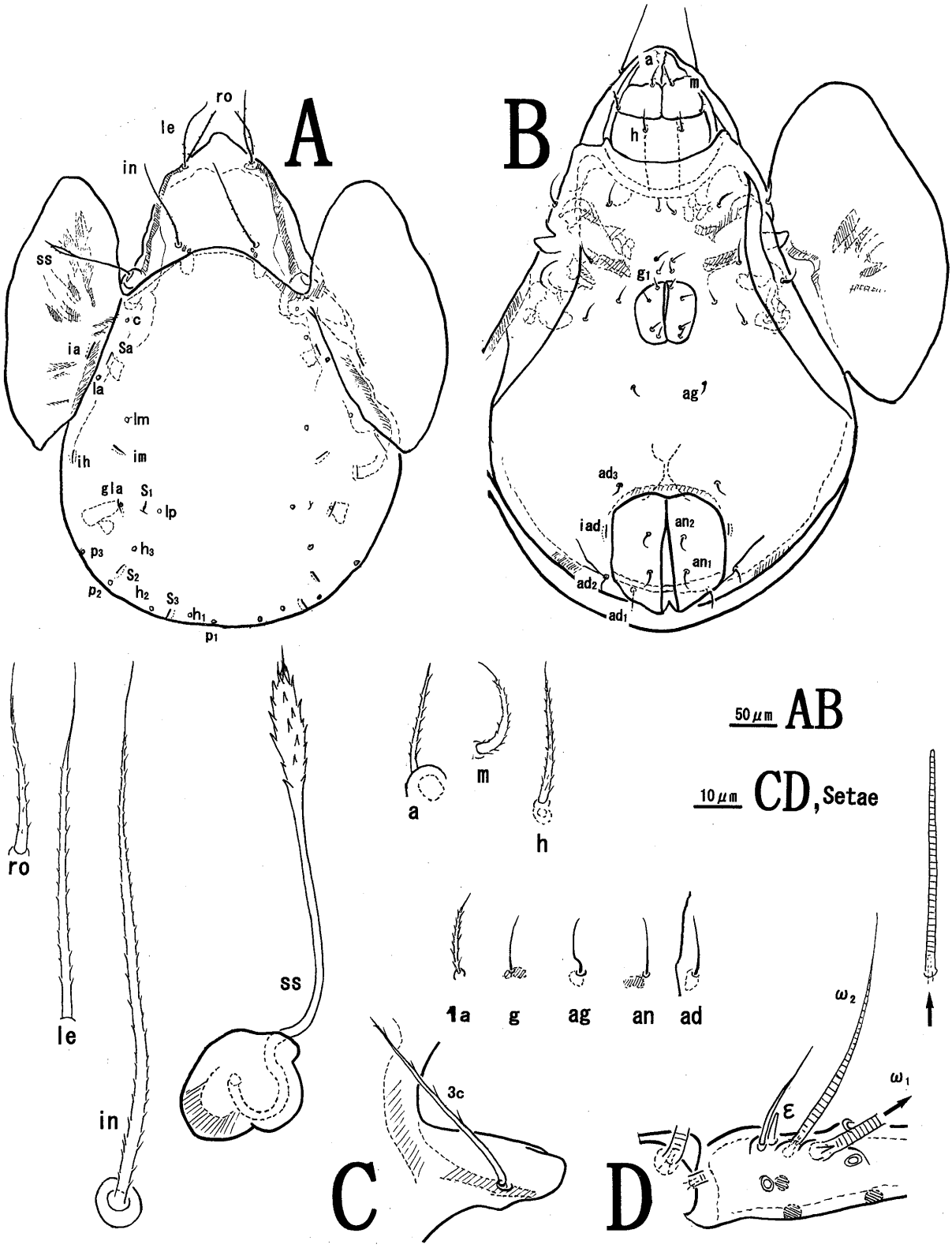

Fig. 3. *Neoribates (Neoribates) similis* n. sp. A (NSMT-Ac 12107♀), Dorsal view; B, C, D,Setae (NSMT-Ac 12109♀); B, Ventral view; C, Left pedoteotum II; D, Left solenidial region of tarsus I.

ro, le, in: Rostral, lamellar, and interlamellar setae; *ss*: Sensillus

c, *la, lm, lp, h*$_{1\text{-}3}$, *p*$_{1\text{-}3}$: Dorsal setae; *ia, im, iad*: Lyrifissures; *g, ag, an*$_{1\text{-}2}$, *ad*$_{1\text{-}3}$: Genital, aggenital, anal and adanal setae; a, m, h: Anterior, medial and posterior subcapitular setae; *1a*: Epimeral setae; gla: Latero-opisthosomatic gland; ε : Famulus on tarsus of leg I; ω $_{1\text{-}2}$: Solenidia on tarsi.

Legs: All tarsi heterotridactylous; Setal formula of legs including famulus, but excluding solenidia: I (1-5-3-4-20), II (1-5-3-4[5]-17), III (2-3-1-3-15), IV (1-3-2-3-12). Setae on TiII variable in number. Solenidiotaxy; I (1-2-2), II (1-1-2), III (1-1-0), IV (0-1-0).

Remarks: The new species has a superficial resemblance to *Neoribates aurantiacus sensu* Aoki (1966) among 17 species of the genus *Neoribates* (*Neoribates*) (Subías, 2004). Aoki (1980) regarded *N. aurantiacus sensu* Aoki (1966) as a synonym of *N. roubali* (Berlese, 1910), but they differ from each other by body size, form of lamellae and interlamellar region, length and form of interlamellar setae. According to the original description and the second description (Oudemans, 1917) of *N. aurantiacus* (Oudemans, 1913[1914]), the type specimen differs from Canadian (Hammer, 1952) and Japanese specimens (Aoki, 1966) in length of lamellae and their relative mutual distances of lamellar and interlamellar setae; the Canadian specimen differs from the Japanese one in arrangement and direction of *Sa*, S_1, *lp* and gland opening. The descriptions of Oudemans (1914; 1917) differ from that of German specimens (Sellnick, 1928; Willmann, 1931) in length of interlamellar setae and their relative mutual distances of setae *le* and *in*, from those of Swiss (Schweizer, 1956), Hungarian (Mahunka, 1996) and Mongolian (Bayartogtokh & Weigmann, 2005) specimens in length of interlamellar setae, and from that of Bohemian specimens (Kunst, 1959) in length of interlamellar setae. The Japanese specimens identified as *N. aurantiacus* by Aoki (1966) might be different from the specimens by Suzuki (1978) in short adanal setae. Individual variation of the specimens collected from Shikoku Island was not observed on length of lamellae, situation of marginal lamellar setae, insertion of ad_3, the number of genital setae and arrangement of *Sa*, S_1, *lp* and gland opening, and then identified as a new species.

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摘　要

藤川徳子 （〒868-0423 熊本県球磨群あさぎり町上南字永里1346-3）：四国産フクロフリソデダニ属の2新種.

2003年から2005年の間に，四国霊場88寺のうち12寺の境内にある落葉，腐植や土壌などから2種類のフクロフリソデダニ属のササラダニを採取した．*Neoribates* (*Neoribates*) *alius* n. sp. クミフクロフリソデダニ（新称）および *Neoribates* (*Neoribates*) *similis* n. sp. ミナミフクロフリソデダニ（新称）と命名し記載した.

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